

1959
Vol. II

CCHEMICAL-BIOLOGICAL WARFARE

by

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No. 14
Oct. 12

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Editorial Research Reports
1156 Nineteenth Street, N.W.
Washington

CHEMICAL-BIOLOGICAL WARFARE

FACTS about chemical and biological weapons of war, long shrouded in mystery, are beginning to come into the open. Revulsion of peoples the world over to putting gases or germs to military use has made most military and government officials reluctant to talk about even elementary precautions the United States is taking to ready itself for this kind of warfare. The State Department in particular has wanted to avoid giving Communist propagandists any possible peg on which to hang new accusations comparable to the spurious germ warfare allegations circulated during the Korean War.

Now, however, the long silence on the subject has been broken. No one is telling technical secrets, but enough has been said to indicate the general nature of the chemical and biological weapons that are being studied or stockpiled, and enough to acquaint the public with the possible advantages of using them in war. The publicity that has started to light up this field has resulted chiefly from the conviction of Army Chemical Corps officers that the people and the Congress need to be exposed to a new view—the view that chemical and biological weapons have not been given their proper strategic role and consequently have not received adequate financial support.

The House Committee on Science and Astronautics, after holding hearings in June, declared in a unanimous report on Aug. 10 that expenditures in this quarter would have to be “at least trebled . . . to speed research to a level of attainment compatible with the efforts of the Communist nations.” Brig. Gen. J. H. Rothschild, ret., former head of the Chemical Corps Research and Development Command, pointed out in a recent magazine article:

Unfortunately, the entire amount of money now allotted to the Chemical Corps for research and development is less than the cost of two B-58 bombers. Given such limited resources, the Chemical Corps must concentrate on the lethal weapons for which

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a need has definitely been established—however desirable and potentially useful it may consider the non-lethal agents to be.¹

Development of new "humane" chemical weapons promises to make C-B warfare somewhat more acceptable to people who have considered it less civilized than other methods of combat. The non-lethal chemical weapons under experimentation would ordinarily incapacitate enemy troops or civilians but not kill or permanently injure them. But it is understood that further research is needed to assure reliable control of the weapons and to reduce production costs.

Both the United States and the Soviet Union apparently have been concentrating on the same lines of chemical and biological weapons. These weapons can be grouped into the two general categories of lethal and non-lethal. Some of the lethal weapons are more deadly than others; similarly, most of the so-called non-lethal agents, even old-fashioned tear gas, could kill or inflict permanent injury if the dose was large enough and the exposure long enough. Nevertheless, the lethal/non-lethal distinction is not without meaning, as indicated by the House Science Committee in its report of Aug. 10: "Where a nerve gas moves from limited effects to lethal effects by a mere doubling of the dose, some of the incapacitating agents would require a thousandfold increase in the application to be lethal, and, therefore, [they] truly live up to the promise of only temporary effect."

DEADLY CHEMICAL AND BIOLOGICAL MATERIALS

Appearance of nerve gases in military stockpiles on both sides of the Iron Curtain represents by far the most significant postwar addition to the lethal section of chemical arsenals. Nerve gases were first developed by German scientists during World War II; the Russians captured the plant and facilities for producing one major type known as GA, while the Americans brought back the entire technology for turning out another called GB. These respective types formed the base on which each country built its own varieties of the deadly nerve gases.

Nerve gas cannot be seen or smelled. As a gas, it can be inhaled; as a liquid, a droplet can penetrate the pores of the skin. Exposure results in destruction of the con-

¹ Brig. Gen. J. H. Rothachild, "Germs and Gas," *Harpers*, June 1959, p. 32.

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nections between nerves and muscles. Symptomatically, this means, in quick order, respiratory troubles, salivation and perspiration, vomiting, cramps, involuntary elimination, convulsions, death. The whole process may last anywhere from a few seconds to 10 or 15 minutes.

Other types of lethal gases include choking gases, like phosgene, which attack the lungs and cause the victim to cough and eventually strangle; blood gases, like hydrogen cyanide, which enter the bloodstream and stop circulation of oxygen through the body; and blister agents like nitrogen mustard. Next to nerve gases, mustard gases are thought to be receiving most attention among the lethal chemicals. The mustard gases, rapidly absorbed through the skin, not only blister but also may cause blindness and upset the functioning of many internal organs. However, Maj. Gen. William M. Creasy, former chief of the Army Chemical Corps, has indicated that nerve gases are relatively more potent. He told the House Committee on Science and Astronautics, June 16, that "Seventy-five tons of mustard gas would [be needed to] do the work of one ton of nerve gas."

DISEASE-PRODUCING AGENTS IN C-B WARFARE

Most of the agents of biological warfare are lethal. Drawn from various categories of living organisms—including fungi, protozoa, bacteria, rickettsias, and viruses—they can be used to attack man, animals, or crops. Among the diseases which minute biological agents can inflict upon man or domestic animals are amoebic dysentery, anthrax, bacillary dysentery, brucellosis, cholera, encephalitis, foot-and-mouth disease, fowl plague, glanders, hog cholera, influenza, malaria, plague, psittacosis, Q fever, Rocky Mountain spotted fever, San Joaquin Valley fever, smallpox, tularemia, and typhus. In addition to diseases caused by micro-organisms are diseases caused by toxins—the poisonous products which living organisms may form; the best known of these is botulism poisoning.

Typically, the agents of biological warfare are invisible; their presence is unknown until the effects have become apparent. One is reminded of the stealthy invasion of dread plagues which in past times took countless lives before they ran their course. But never before have germs been deliberately cultivated to help one country subdue another in war.

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TEMPORARILY INCAPACITATING CHEMICAL AGENTS

While the function of many agents of chemical warfare and most agents of biological warfare is to produce death or disability, some chemical agents are designed simply to incapacitate an enemy for a short time. Among the so-called non-lethal gases, tear gas and vomit gas have been on hand for a long time. Amazing new gases, usually referred to as psychochemicals or incapacitating agents, have been developed in recent years.

Incapacitating agents fall into two groups: those which produce temporary mental aberration and those which produce temporary physical disability. Experimental work on both types is still in the early stages, but certain chemicals that bring on hallucinations have already been developed. Two films demonstrating the effects of psychochemicals on the mind were run off before the House Science Committee last June. The committee reported that "A cat receiving the new drug was so reversed in character that it was in great terror of mice in its cage, cowering and leaping about wildly to keep its distance from the mice." The other film showed that "Troops exposed to one of these agents were not even conscious of their abnormal condition"; they were unable to follow simple commands or to perform normal tasks satisfactorily.

The committee also witnessed "live" demonstrations of how the physical incapacitators work. In one experiment test animals were completely immobilized; their eyes remained open but their bodies were rendered insensitive to pain. Short-lived blindness or deafness can be produced by other agents on which research is under way.

Most of the psychochemicals so far tested produce effects that completely disappear within 24 to 48 hours. However, it is impossible to predict how different people will react to the same chemical. Gen. Creasy suggested, for example, that if a small group of men in a closed room were exposed to the same hallucinogenic agent, one might climb upon a table and begin to dance, another might stand nearby and applaud, while still others might display symptoms of deep depression or anxiety.

Alleged Advantages of New Weapons

PERSONS who think the United States should spend more money on, and assign higher strategic importance to, gas and germ weapons put heavy stress on the special features of these weapons as a group. Army Chemical Corps officers have pointed most frequently to "four unique advantages" of a chemical-biological weapons system:

Chemical and biological weapons represent great offensive power at comparatively small cost in terms of expenditures for research and development, outlays for production and distribution, and critical material requirements.

They are "search weapons," which blanket an area and penetrate all crevices, thus reaching the enemy whether he is widely dispersed or concentrated in fortified places.

A fully developed chemical-biological weapons system offers a wide choice of desired effects on enemy personnel, ranging from highly deadly to mildly incapacitating, and thus provides a flexibility unknown in the case of high explosive and nuclear systems.

Finally, toxic warfare, while highly effective against man and his sources of food, leaves intact the cities and industries likely to be destroyed by high explosive and nuclear weapons.

These considerations, and the particular properties of each major gas or germ weapon, have led to formulation of various plans for use of chemical and biological agents.

LETHAL GASES: TARGETS AND DELIVERY METHODS

In the field of chemical warfare, the use of nerve gases, powerful as they are, would probably have to be limited to a target area no larger than a few hundred square miles; otherwise the gases might become too diluted to remain effective. Nerve gases could be delivered in a variety of ways—in missiles launched from submarines offshore, in long-range artillery shells, or in bombs dropped from aircraft. Gen. Creasy told the House Science Committee, June 16, that an effective nerve gas carrier might be a large bomb containing "100 to 1,000 or more" smaller bombs. "As these [large bombs] open in the air the [smaller] bombs fall out and widen the glide path, and they are so designed that they are let loose at a given altitude, so that you have a homogeneous cloud pattern on the ground as the bombs hit."

Nerve gases delivered in liquid particle (or persistent) form will linger in the air for weeks to attack the unwary.

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Because they readily penetrate clothing, persistent nerve gases render protective masks virtually useless. Non-persistent nerve gases—those delivered in gaseous form—are particularly effective against hard-to-reach targets. Concrete redoubts are no protection. The gases can be sucked into ventilation shafts of conventional shelters to overcome victims conveniently grouped for destruction.

The other chemical agents in national stockpiles, including lethal blister and choking gases, could probably be used effectively only in local battlefield situations—as they were used in World War I. The House Science Committee reported, Aug. 10, that “Probably only nerve gas of the presently known chemical agents offers the advantage of effectiveness in limited weight to be worth dropping from aircraft or missiles in anything other than a local tactical employment.”

POSSIBLE USES FOR DEADLY BIOLOGICAL AGENTS

Biological warfare in a sense presents more fearful possibilities than chemical warfare. Germs, used as strategic weapons, could be spread over thousands of square miles in a wind-propelled mist. Or diseased insects could be surreptitiously released in such fashion that it might not be possible to tell that the resulting epidemic had been caused by artificial means. In a strategic attack an adversary could use missiles or aircraft to strike with germ-laden warheads at selected locations.

Gen. Rothschild has pointed out that a strategic germ attack would yield greater military advantage than a natural epidemic because “Biological warfare would strike an entire population *at the same time* and those infected would get sick at about the same time—including doctors, nurses, transportation workers, and so on.” There would be little opportunity to marshal defenses; moreover, the attack probably would produce diseases that are hard to diagnose and hard to combat. Rothschild said that “If even 10 to 20 per cent of the population were affected over an area of thousands of miles—as is quite possible—*everything* would come to a stop.”²

More restricted biological attacks also could be launched. Germs could be loosed against part of a country or against troop concentrations rather than against the whole popu-

² *Ibid.*, p. 33.

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lation. An enemy's crops or domestic animals might be made the target in hope that the enemy would be forced to capitulate under threat of starvation. Finally, biological weapons could be used for sabotage. The United States might be a particularly favorable target for the biological saboteur, considering its great number of air-conditioned buildings, its concentrated drug production, and its centralized food-processing industries.

It is not difficult to speculate on ways in which chemical and biological weapons might be used in combination with thermonuclear weapons. Even if enough adequately equipped shelters existed in cities of the United States and the Soviet Union to give protection from bombs, missiles, or radioactive fallout, they would prove of little value if nerve gas were released in the vicinity of the ventilation shafts. Nor could much safety be found in remote sections of a large country; while nuclear warheads were being dropped on cities, strategic centers, or both, germ warheads could be lofted into the hinterland.

Non-lethal incapacitating agents also might prove highly effective in combination with nuclear weapons. The House Science Committee observed in its August report: "Timed to coincide with a general attack, they could confuse personnel of anti-aircraft batteries and interceptor pilots. Introduced into a command center, there is no telling what psychochemicals would do, except that the results would be disastrous."

USE OF PSYCHOCHEMICALS TO REDUCE CASUALTIES

Psychochemicals used by themselves, on the other hand, might form the basis of an alternative to devastating war. Gen. Rothschild was referring chiefly to these weapons when he wrote: "War will never be less than horrible, but chemical and biological warfare offers at least some small hope of carrying it on without unnecessarily destroying large numbers of troops, their families, and their cities."³ As Gen. Creasy explained to the House Science Committee, June 16, the incapacitating agents "still leave the requirement of somebody coming in and taking over with force." However, they "give the soldier an opportunity to come in without being fired at," and they "open up a new vista of controlling people without any deaths."

The House Science Committee's report cited a memorable

³ *Ibid.*, p. 30.

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battle of World War II to illustrate the possibilities of psychochemicals. At the time Iwo Jima was attacked in 1945, "war gases were available to the American commander" but were not used "on humanitarian grounds." Instead, the Japanese were dislodged by explosives and flame. But in the process almost 21,000 enemy troops and 7,000 U.S. marines were killed. A total of 18,000 more Americans were wounded, and the island's airfield was destroyed. "With gas, the same result would have been obtained . . . but the airfield would have been intact, and 25,000 American casualties would have been avoided. If the new incapacitating agents had been available, it is conceivable that neither side would have lost any appreciable number of men."

DRAWBACKS AT PRESENT STAGE OF DEVELOPMENT

Champions of C-B warfare concede, however, that tactical employment of chemical or biological weapons may involve risks for friendly as well as enemy forces. A strategic biological attack, moreover, might not succeed unless the attacker got virtually all of the "breaks"; the wind would have to blow or shift just as anticipated, and other weather conditions would have to turn out as predicted to keep the micro-organisms alive. In addition, numerous problems regarding production, storing and distribution of chemical and biological agents remain to be solved.

What this set of doubts boils down to is whether it is possible to control chemical and biological weapons in such a way that attainment of the desired military objectives can be reasonably assured. Walter Schneir, editor of a medical magazine, has recalled what happened a few years ago when U.S. forces made simulated use of biological weapons in war games in Southeast Asia. Chinese forces were assumed to have penetrated South Viet Nam and to be certain of reaching Pnompenh, capital of Cambodia, before they could be intercepted by U.S. land forces dispatched from Thailand. "When Chemical Corps experts calculated the results, the State Department was so alarmed that it made a vain effort to suppress them. For along with the seventy-five per cent of the enemy troops assumed to have been killed or incapacitated were some 600,000 casualties among friendly or neutral civilians."⁴

⁴ Walter Schneir, "The Campaign to Make Chemical Warfare Respectable," *The Reporter*, Oct. 1, 1959, p. 27.

Preparations for Gas-Germ Warfare

PSYCHOCHEMICALS have not yet been developed to a stage at which they can be produced in the quantities required for effective employment as weapons. Their usefulness at present is confined largely to the field of medicine, where hallucinogenic drugs have been administered by a few psychiatrists as an aid to detecting causes of psychoses.

The only non-lethal weapons currently being stockpiled by the Defense Department, according to Walter Schneir, are tear gas and vomit gas. Tear gas occupies a special place among gases in that it is perhaps the only one that has been used to quell rioting mobs without provoking public indignation. Vomit gas also has been employed to break up mobs, and it may be used in combat to force men to remove protective masks and so become vulnerable to assault by more damaging agents.

As for deadly chemical agents, Schneir reports that the United States has been stockpiling two classes of lethal gases—nitrogen mustards and nerve gases.⁵ Gen. Creasy told the House Science Committee, June 16, that the United States has built up "quantities" of various types of nerve gases, which form "the bulwarks of our American stockpile [of lethal gases] today." The nerve gases in U.S. chemical arsenals were manufactured until recently at the Rocky Mountain Arsenal, near Denver. That plant has been shut down—partly because of complaints from Denver residents disturbed by the proximity of such death-dealing materials. The Chemical Corps now has begun converting an Atomic Energy Commission plant at Newport, Ind., for manufacture of nerve gases.

The chief center of biological weapons research is at Fort Detrick in Frederick, Md. Field testing of biological weapons is carried on at Dugway Proving Ground, southwest of Salt Lake City. Infected insects are kept constantly on hand at these places. Collections include mosquitoes infected with yellow fever, malaria, and dengue; fleas infected with plague; houseflies with cholera, anthrax, and dysentery; and ticks with tularemia, relapsing fever,

⁵ *Ibid.*, pp. 25-26.

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and Colorado fever. Methods of spreading biological agents and toxins by means of aerosol sprays, instead of through release of infected insects, have been successfully developed and tested. Mass breeding of pathological organisms also has been undertaken, and studies are in progress on effective means of spreading plant diseases.

DEVELOPMENT OF GAS-GERM WEAPONS IN RUSSIA

There are numerous indications that the Soviet-led nations have been engaged in a full-scale build-up of chemical and biological weaponry. Maj. Gen. Marshall Stubbs, chief of the Army Chemical Corps, told the House Science Committee, June 22, that "The information I have received adds up to a total Communist effort in biological warfare greater than ours." In testimony before a House Appropriations subcommittee on April 27 Stubbs had said: "The Russians are intensively conducting research and development in chemical and biological warfare and are known to have a number of chemical-agent production plants." He added that "Their interest is not just limited to lethal agents, but actually encompasses a wide variety of agents ranging in effect from those mildly incapacitating to those producing death."

Lt. Gen. Arthur C. Trudeau, chief of Army Research and Development, recently told an Associated Press correspondent: "We are behind. We have C-B munitions in the laboratories, [but American] counter-offensive ability to meet a Soviet challenge in the chemical-biological warfare field . . . is very limited, at best." Trudeau said that "The Soviet armies facing Western Europe have 15 per cent of their munitions in chemicals," and that Soviet troops carry atropine syrettes in their medical kits as an antidote for deadly nerve gases. "The Russians know we don't equip our troops to use nerve gas offensively, so they must carry the syrettes to protect themselves against their own gas."⁶

It has been reported that each of the Red Army's 400 ground divisions has a chemical warfare unit. Soviet chemical troops are equipped with modern weapons and equipment and are assigned to all echelons down to battalion level. A further indication of how seriously the Soviet Union views gas and germ warfare is shown by the support given DOSAAF, its massive civil defense organization.⁷

⁶ Associated Press feature by Roger Greene, *Washington Post*, Aug. 6, 1953.

⁷ The term "DOSAAF" means Voluntary Society for Cooperation with the Army, Navy and Air Force.

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Some 30 million Soviet citizens have completed a twenty-hour training program on measures to take in case of chemical or biological attack.

Soviet policy on chemical and biological warfare is much less cautious than American policy. Soviet military spokesmen have plainly implied on many occasions that they would not hesitate to resort to chemical and biological weapons if they thought it to their advantage. Marshal Georgi K. Zhukov, then defense minister, observed before the Communist Party Congress at Moscow in January 1957: "The U.S.S.R. is rebuilding its armed forces on the basic assumption that the means and forms of future war will differ in many respects from past wars. We will see the mass use of air power, various types of missiles, and means of mass destruction like nuclear, chemical, and biological weapons."

DRAG ON PROVISION OF FUNDS IN UNITED STATES

American policy on C-B warfare—as reflected in official pronouncements—has not been nearly as bold. Although U.S. leaders have made it clear that this country might use *nuclear* weapons if necessary to halt aggression, stated national policy toward *chemical and biological* weapons has remained unchanged since 1943. In that year President Roosevelt set United States policy on gas-germ warfare when he said: "I have been loath to believe that any nation, even our present enemies, could or would be willing to loose upon mankind such terrible and inhumane weapons. . . . I state categorically that we shall under no circumstances resort to the use of such weapons unless they are first used by our enemies."

Taking sharp issue with that stand, Gen. Rothschild wrote recently: "We must reject once and for all the position stated by President Roosevelt that an enemy can have the first chemical or biological blow wherever and whenever he wishes. That blow could be disastrous."⁸ Gen. Creasy "summed up his own feelings" on the issue when he told the House Science Committee on June 16: "Our programs are not being prosecuted, dollarwise, or with the motivation that they would be prosecuted, if we had a clearly stated policy that put [chemical and biological weapons] in exactly the same category that we put the atomic bomb and all other things, and in essence if we said

⁸ J. H. Rothschild, "Germs and Gas," *Harpers*, June 1959, p. 24.

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we will use these things as we damn well see fit, when we think it is in the best interests of the United States and their allies." Creasy added: "Then, and only then, will you have a situation when you would bring men, money, and motivation to bear properly on the problem."

Present and former chiefs of the Army Chemical Corps have voiced the belief that if chemical and biological weapons were placed on a strategic par with other weapons in the American arsenal, fund allocations to the corps—which have averaged less than \$100 million since 1956—would rise as a matter of course. Most of the money available in recent years has gone for procurement, operations and maintenance. Gen. Stubbs told the House Science Committee on June 22 that expenditures for research and development had been "on the order of \$35 million or \$40 million a year"—or about one one-thousandth of the country's total defense budget; all offensive and defensive projects in the chemical and biological fields have had to be supported from this allocation—everything from development of protective clothing to creation of a synthetic disease agent.

In practice, about half of the annual appropriation for research and development has been devoted to biological projects, half to chemical projects. As a result, any single program—development of psychochemicals, for example—has more than likely not fared well. Gen. Creasy on June 16 said the existing program for research in psychochemical warfare was "woefully small" and that "The amount of money in that program is down in the hundreds of thousands." He informed the House Science Committee that barring unexpected and spectacular breakthroughs, psychochemicals could be developed into ready weapons in "five or ten years," provided spending was stepped up to a "decent-sized" level.⁹

Gen. Stubbs, appearing before the House Science Committee on June 22, said the Chemical Corps budget for research and development should be progressively increased over the next two or three years to a goal of \$125 million annually. The committee in effect went along by recommending that "serious consideration be given to the re-

⁹ Creasy explained that "The logistics of the psychochemicals will probably for a time compare with the logistics of mustard gas, as distinguished from the logistics of the nerve gases." This means that the gases, until improved, would be primarily useful in local tactical situations.

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quest of Defense officials that [present spending] be at least trebled." But although Stubbs had originally sought \$65 million for research and development in fiscal 1960, Congress allowed only \$43 million.

Troubling Questions About C-B Warfare

PUBLIC DISCUSSION of pleas for increased emphasis on chemical and biological warfare has yet to take full shape. Army Chemical Corps officers are aware that sharp controversy would be provoked by administration support of substantially increased appropriations for C-B research and development, particularly if accompanied by frank withdrawal of President Roosevelt's pledge that the United States never would use chemical or biological weapons unless in retaliation for their use by an enemy. However, the Chemical Corps is willing to wager that an enlightened public would do more to strengthen its case than to weaken it. Observing that the public has been left "unprepared for the use of these weapons, either for us or against us," Gen. Rothschild has drawn a parallel with the case of nuclear weapons:

A somewhat similar situation existed with respect to nuclear energy after the war, until the press forced the government to release more information. Now there is an informed and articulate public which would, presumably, be prepared to support the government in certain uses of nuclear weapons, but which has also played a definite part, I believe, in encouraging their control and the development of the so-called "clean bomb." I see no reason why public discussion of chemical and biological warfare could not be equally useful and responsible.¹⁰

Official reluctance to discuss gases and germs as weapons that might be properly employed against an aggressor stems from recognition that almost everyone instinctively dreads chemical and biological warfare. The popular opposition in turn represents to some extent an inheritance from the revulsion widely felt when poison gas was used to suffocate men in the trenches in World War I.

TREATIES PROHIBITING RESORT TO TOXIC WARFARE

Use of poison gas of some kind was proposed but rejected in the Napoleonic Wars, the Crimean War, and the

¹⁰ J. H. Rothschild, "Germs and Gas," *Harpers*, June 1959, p. 31.

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American Civil War. Even before the Germans initiated its use in World War I, sentiment against such a weapon had found expression in international agreements. Employment of gas was first denounced formally at a conference convened in Brussels after the Franco-Prussian War to codify rules of warfare over which controversy had arisen during that conflict. An article of the Brussels Declaration of 1874 prohibited use of "poison or poisoned weapons."

A convention drafted at the first Hague conference in 1899 contained a provision under which the contracting powers agreed "to abstain from the use of projectiles the sole object of which is the diffusion of asphyxiating or deleterious gases."¹¹ At the second Hague conference in 1907, 43 nations approved an amendment barring use of "poison or poisonous weapons" in war.

Ratification of the Hague convention of 1899 by Germany did not prevent that country from introducing asphyxiating gases on the western front on April 22, 1915. Release of wind-borne chlorine gas from cylinders on that day surprised and demoralized British, Canadian and French troops along a four-mile line near Ypres. The position had to be abandoned within an hour, and the Allies counted 5,000 dead among 15,000 to 20,000 casualties. The British made a retaliatory gas attack six months later. In December 1915 the Germans disseminated phosgene, a choking gas capable of penetrating the protective masks then in use. After masks had been improved, the Germans introduced vomit gas to force men to remove their masks and expose their lungs to phosgene. The French and Austrians initiated the use of blood gases in 1916, and the Germans introduced mustard gas in July 1917. By the time the war ended, nine million artillery shells filled with mustard gas had been fired by the major contestants on both sides.

Rexmond C. Cochrane, authorized by the Army Chemical Corps to study the effects of poison gas on American troops in World War I, has related that the panic caused by gas attacks was often more destructive than the attacks themselves. When attacked, men often threw away everything that burdened them, including machine guns. Officers and

¹¹ Twenty-seven countries, including the United States, signed and ratified the Hague convention. The earlier Declaration of Brussels never came into force owing to Great Britain's refusal to ratify.

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enlisted men alike considered masks a nuisance and often failed to keep them close at hand despite repeated warnings. American soldiers were frequently unprepared, psychologically or militarily, when subjected to gas attack. Cochrane has written that on the basis of World War I experience, "It can be assumed that the panic aspects of chemical warfare can happen again, because human nature doesn't change very much."¹²

After World War I, no country was more active than the United States in seeking to outlaw poison gas. A treaty for that purpose, negotiated at the Washington arms limitation conference of 1921-22, was ratified by the U.S. Senate on March 29, 1922, but failed to go into effect in the absence of ratification by France.¹³ The United States persisted, however, and at Geneva in 1925 the nations drafted a Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare. Ironically, the United States never ratified the protocol, but it came into force and is still in force for the two score or more ratifying powers. They included Great Britain, the Soviet Union and France, who specified that they would not consider the obligation binding as respecting any country that failed to live up to the treaty provisions.

COMMUNIST EXPLOITATION OF GERM WAR CHARGES

Communist governments have not hesitated to exploit public hostility to gas-germ warfare by means of misrepresentations and outright falsehoods. How effective the propaganda has been cannot be measured with certainty, but there is no doubt about two things: (1) Communists for the past decade have steadily lied about American activities in the C-B field; and (2) it has not been possible to spread the falsity of the Communist charges on the record of any United Nations body—chiefly because of limitations implicit in the power structure of U.N. bodies.

The Communist press cited hearings on the status of C-B programs before the House Science Committee last June as evidence that the United States was stepping up preparedness for germ warfare. In a broadcast on July 4, Gregory Morozov, Soviet radio commentator, called Chemi-

¹² Hal Willard, "Poison Gas' Lesson from the Past," *Washington Post*, June 8, 1958.

¹³ Refusal of France to ratify was explained by objection to provisions on submarine warfare in the same treaty.

cal Corps spokesmen "advocates of the plague" and said "the Pentagon's misanthropes" should be "slapped in straitjackets." Tracing American-led activities over the past decade, Morozov charged that U.S. forces tested biological weapons on Canadian Eskimos in 1949 and started an epidemic; that poisonous gases were used against inmates of prisoner of war camps during the Korean War; that Americans introduced the Colorado beetle into East Germany and Czechoslovakia in 1950; and that Nationalist Chinese forces bombarded Red Chinese in 1958 with chemical shells supplied by the United States.

This country's civilian and military leaders have steadfastly denied these and similar charges. At the time of the Korean War, when the Communists repeatedly accused United Nations forces of spreading germs, efforts were made in both the Security Council and the General Assembly to disprove the charges. However, the Communist countries succeeded in preventing an impartial investigation. The Soviet Union in 1952 vetoed a Security Council resolution for a Red Cross inquiry. When the General Assembly voted the following year to set up an independent investigative commission, Red China and North Korea refused to give it entry.

C-B WEAPONS AND THE PROBLEM OF DISARMAMENT

Although poison gases were employed in the Italian campaign against Ethiopia in the 1930s, and by Japanese forces fighting the Chinese,¹⁴ no gas or biological attacks were launched on the major battlefields of World War II. Toxic weapons were carried in armies on both sides. Permission to use them was often requested but as often denied, for humanitarian reasons or fear of retaliation or both.¹⁵ At the same time, extensive use was made of related weapons having effects perhaps even more horrible—napalm and other incendiary bombs, phosphorus shells, flame throwers.

Talk of devising an effective ban on chemical and biological weapons has been subordinated since World War II to discussion of nuclear disarmament. Whenever the matter of outlawing gas-germ warfare has arisen, inside or

¹⁴ Italians directed mustard gas against the bare feet of Ethiopians in 1936, and the Japanese made frequent gas attacks on the Chinese between 1937 and 1943.

¹⁵ Exceptions were minor. Evidence exists that Nazi agents in this country injected disease germs into animals about to be shipped overseas; the Germans also inoculated Rumanian cavalry horses with glanders.

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outside the United Nations, the Soviet Union has cited refusal by the United States to ratify the 1925 Geneva protocol as evidence of ill intent. The United States, for its part, has consistently maintained that banning of C-B weapons must be viewed and acted upon in the context of overall disarmament. On this issue, as on other disarmament issues, the question of inspection and control has been the main point of contention.

When Soviet Premier Khrushchev addressed the U.N. General Assembly on Sept. 18, he specifically included in his disarmament proposals "prohibition of the production, possession and storing of the means of chemical and bacteriological warfare and the destruction of the stockpiles of these types of weapons." President Eisenhower, asked about chemical and biological warfare at a news conference last June 17, replied: "We shouldn't talk about nuclear warfare alone. The disarmament matter has to be dealt with pretty much across the board." The President added that many weapons "anybody could use" are available in addition to nuclear weapons.

The chief obstacle in the path of successful East-West disarmament negotiations—provision for inspection and control—looms largest in the context of gas-germ weapons. An international group of scientists, gathered at Cyrus Eaton's "Home for Thinkers" in Pugwash, Nova Scotia, last summer, said that inspection of C-B warfare preparations seemed "incomparably more difficult than control of atomic weapons." The House Science Committee in its report on Aug. 10 stressed "the ease of hiding the manufacture of very considerable amounts of such material." It explained: "The telltale signs which might disclose nuclear experimentation are lacking in chemical and biological weapons. . . . An old brewery or drug house could be the cover for a considerable biological effort, carried on not only in the country planning their use, but in a free enterprise country which was the intended victim."

GAS-GERM REALITIES; ALTERNATIVES FOR THE FUTURE

The Army Chemical Corps believes that unless foolproof disarmament provisions can be agreed upon, there are at least three good reasons why the United States should strengthen its chemical-biological weapons system. First, the record shows that in World War I, when psychochemicals were not available, relatively fewer deaths were caused

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by gas than by conventional weapons. Of the 272,000 casualties suffered by American forces, 27 per cent were inflicted by gas. But only 2 per cent of the gas casualties, in contrast to 26 per cent of non-gas casualties, resulted in death.¹⁶

Secondly, it is argued that defense against a gas-germ attack would be infinitely more difficult and costly than an offensive build-up. To cite one example, the antidote for nerve gas must be administered within two minutes after exposure; otherwise it is too late. Finally, Chemical Corps spokesmen insist that agreements with totalitarian powers do not offer adequate security safeguards. This country and its allies, they assert, must make their combined C-B programs at least as strong as comparable efforts of the Communist countries. Gen. Creasy reminded the House Science Committee, June 16, that the decision of Nazi Germany to refrain from using nerve gases against Allied forces stemmed neither from humanitarian motives nor from treaty commitments. Creasy said:

It is a publicly known fact that the Germans did have the nerve gases, [and that] they had issued the orders to use them in Normandy, on D-Day. At that time we had only a vague inkling that such things existed. We did not have any protection against them, our masks would have been completely useless; and had they [the nerve gases] been used, it is my personal judgment we would not have gotten ashore. They were not used because by some mischance or meddling with Hitler's intelligence people he was informed we were in a position of retaliating overwhelmingly. Of course, we were not.

Chemical and biological weapons may turn out, sooner or later, to be the most selective and potent of all weapons known to man. That possibility, linked with the fact that gas-germ warfare preparations virtually defy inspection, may finally provide the impetus to a disarmament agreement which can rest securely on the good faith that in the end alone assures observance of compacts between nations.

¹⁶ In addition, men who were gassed suffered proportionately fewer lasting effects than those struck down in other ways. Only 7 per cent of the gas casualties, as against 25 per cent of other casualties, led to disability discharges.



